No. III.

Abstracts of Calculations to ascertain the Longitude of the Capitol, in the City of Washington, from Greenwich Observatory, in England. By William Lambert.—Read July 18th, 1817.

JANUARY 21st, 1793.

Occultation of α *Tauri* (Aldebaran) observed by Andrew Ellicott, Esq. supposed to have been at the Capitol, in the city of Washington. Latitude of the place of observation stated at 38° 52′ 40″ North.

Latitude of the place, reduced (320 to 319)	-	38° 42′ 9″.51 N.
Longitude assumed for the calculation	-	76 46 0.0 W.

Immersion, at	7h 55′ 49″.50	P. M. apparent time.
Emersion, at	9 25 21.50	

By De La Lande's Tables.

Star's *mean* right ascension	66° 0′ 57″.64		*Mean* declination N.	16° 4′ 47″.47	
Nutation - -	— 0 2.87		Nutation -	— 0 9.10	
Aberration -	+ 0 11.84		Aberration	+ 0 0.27	
Right ascension -	66 1 6.61		Declination N.	16 4 38.64	

Obliquity of the ecliptic, January 21st, 1793		23° 27′ 48″.32
Star's longitude, by computation	-	66 53 59.50
latitude, south	- -	5 28 54. 0

Moon's Longitude at Greenwich (Naut. Alm.).

1793. Jan. 20.	Midnight	53°	46′	59″	A	+	6°	12′	35″	*a* 1	—	3′	14″	*a* 2	+	24″	*a* 3	. 0″	*a* 4
21.	Noon	59	59	34	B	+	6	9	21	*b* 1	—	2	50	*b* 2	+	24	*b* 3		
	Midnight	66	8	56	C	+	6	6	31	*c* 1	—	2	26	*c* 2					
22.	Noon	72	15	26	D	+	6	4	5	*d* 1									
	Midnight	78	19	31	E														

Moon's Latitude, South.

1793. Jan. 20.	Midnight	4°	46′	3″	A	+	10′	56″	*a* 1	—	3′	31″	*a* 2	—	0′	2″	*a* 3	+	5″	*a* 4
21.	Noon	4	56	59	B	+	7	25	*b* 1	—	3	33	*b* 2							
	Midnight	5	4	24	C	+	3	52	*c* 1	—	3	30	*c* 2	+	0	3	*b* 3			
22.	Noon	5	8	16	D	+	0	22	*d* 1											
	Midnight	5	8	38	E															

By the Immersion.

Apparent time of the immersion	7h	55′	49″.50			118°	57′	22″.50
Estimated longitude, West,	5	7	4.					
Corresponding time at Greenwich	13	2	53.50	Sun's R. A.		304	52	19 03
Right ascension of the meridian, from beginning of ♈						63	49	41 53
Do. do. from beginning of ♎						153	49	41 53
Altitude of the nonagesimal						72	51	36.14
Longitude of the nonagesimal, from beginning of ♈						68	53	14.05
Moon's *true* longitude (Naut. Alm.)						66	41	2.33
true latitude, South,						5	4	52.75
true distance from the nonagesimal (West)						2	12	11.72
equatorial horizontal parallax						0	55	7.78
horizontal parallax reduced (320 to 319)						0	55	3.71
parallax in longitude						0	2	3.74
apparent distance from the nonagesimal (West)						2	14	15.46
parallax in latitude						0	21	7.91
apparent latitude, South,						5	26	0.66
augmented semidiameter, arising from apparent altitude						0	15	15.26
inflexion of light						—	0	2.98
semidiameter, corrected						0	15	12.28
Difference of apparent latitude, * south of ☽'s center						0	2	53.34

To find the Difference of Longitude between the Moon's Limb, at the Point of Occultation, and the Moon's Center.

Moon's semidiameter, corrected		912″.28			
Difference of apparent latitude		173.34			
	Sum,	1085.62		log.	3.0356778
	Diff.	738.94		log.	2.8686092
					2)5.9042870
					2.9521435
Arith. comp. cosine Moon's apparent latitude					0.0019558
Diff. ☽'s longitude	14′ 59″.70	=	899″.70	log.	2.9540993

Star's longitude,			66° 53′ 59″.50
Parallax in longitude,			+ 2 3 .74
True longitude ☽'s limb, at the point of occultation,			66 56 3 .24
Difference of longitude,			— 14 59 70
True longitude of ☽'s center, by calculation,			66 41 3 .54
Apparent time at Greenwich, when the Moon had that longitude,			13h 2′ 55″.86
Apparent time of the immersion at Washington,			7 55 49 50
Longitude, in time, found by the immersion,			5 7 6 .36
	Equal to		76° 46 35 .40

By the Emersion.

Apparent time of emersion	9h 25′ 21″.50		141° 20′ 22″.50
Estimated longitude, West,	5 7 4 .—		
Corresponding time at Greenwich	14 32 25 .50	Sun's R. A.	304 56 14 29
Right ascension of the meridian, from beginning of ♈			86 16 36 .79
Do. do. from beginning of ♑			176 16 36 .79
Altitude of the nonagesimal			74 43 18 .57
Longitude of the nonagesimal, from beginning of ♈			86 59 19 .53
Moon's *true* longitude (Naut. Alm.)			67 26 43 .90
true latitude, South,			5 5 30 .86
true distance from the nonagesimal (West)			19 32 35 .63
equatorial horizontal parallax			0 55 6 .04
horizontal parallax reduced (320 to 319)			0 55 1 .97
parallax in longitude			0 18 5 .56
apparent distance from the nonagesimal (West)			19 50 41 .19
parallax in latitude			0 19 8 .96
apparent latitude, South,			5 24 39 .82
augmented semidiameter, arising from apparent altitude			0 15 14 .09
inflexion of light			— 0 2 .98
semidiameter, corrected			0 15 11 .11
Difference of apparent latitude, ✳ south of ☽'s center			0 4 14 .18

Moon's semidiameter, corrected		911″ 11		
Difference of apparent latitude		254 .18		
	Sum,	1165 .29	log.	3.0664340
	Diff.	656 .93	log.	2.8175191
				2)5.8839531
				2.9419765 5
Arith. comp. cosine Moon's apparent latitude				0.0019406.6
Diff. ☽'s longitude	14′ 38″.85	= 878″.85	log.	2.9439172

Star's longitude,			66° 53′ 59″.50
Parallax in longitude,			+ 18 5 .56
True longitude of ☽'s limb, at the point of occultation			67 12 5 .06
Difference of Moon's longitude,			+ 14 38 .85
True longitude, Moon's center, by calculation,			67 26 43 .91
Apparent time at Greenwich, when the Moon had that longitude,			14h 32′ 25″.52
Apparent time of emersion at Washington,			9 25 21 .50
Longitude, in time, found by the emersion,			5 7 4 .02
	Equal to		76° 46 0 .30
	By the immersion,		76 46 35 .40
Mean result—Longitude found by occultation of January 21st, 1793,			76 46 17 .85

October 20th, 1804.

Occultation of ν Pleiadum (Alcyone,) by the Moon, observed by Messrs. Abraham Bradley and Seth Pease, North 75° W. one mile 7-10ths (estimated) from the Capitol. Difference of longitude, — 1′ 49″.75.

Latitude of the place of observation, estimated,		38° 53′ 30″.00 N.
Do. do. reduced (320 to 319)		38 42 59 .44
Longitude assumed for the calculation		76 56 51 —W.
Time of immersing by watch,	9h 30′ 2″.—	
Watch too fast,	— 7 32 .8	
Apparent time of immersion,	9 22 29 .2	
Time of emersion, by watch,	10h 24′ 40″	
Watch too fast,	— 7 32 .8	
Apparent time of emersion,	10 17 7 .2	

By De La Lande's Tables.

Star's *mean* right ascension	53° 58′ 33″.80		Declination N.	23° 29′ 35″.20	
Nutation	+ 0 14 .96		Nutation	+ 0 8 .10	
Aberration	+ 0 18 .77		Aberration	+ 0 3 48	
Right ascension	53 59 7 .53		Declination N.	23 29 46 .78	
Obliquity of the ecliptic, October 20th, 1804,				23° 27′ 54″.25	
Star's longitude, by computation				57 16 37 .44	
latitude, north. do.				4 2 1 .16	

Moon's Longitude at Greenwich (Naut. Alm.).

1804. Oct. 19.	Midnight	39°	44′	37″	A	+	7°	34′	6″	*a* 1											
20.	Noon	47	18	43	B	+	7	33	9	*b* 1	—	0′	57″	*a* 2							
	Midnight	54	51	52	C	+	7	31	1	*c* 1	—	2	8	*b* 2	—	1′	11″	*a* 3			
21.	Noon	62	22	53	D	+	7	27	48	*d* 1	—	3	13	*c* 2	—	1	5	*b* 3	+	6.″	*a* 4
	Midnight	69	50	41	E																

Moon's Latitude, North.

1804. Oct. 19.	Midnight	4°	56′	34″	A	—	8′	49″	*a* 1												
20.	Noon	4	47	45	B	—	13	50	*b* 1	—	5′	1	*a* 2								
	Midnight	4	33	55	C	—	18	33	*c* 1	—	4	43	*b* 2	+	0′	18″	*a* 3				
21.	Noon	4	15	22	D	—	22	49	*d* 1	—	4	16	*c* 2	+	0	27	*b* 3	+	9″.	*a* 4	
	Midnight	3	52	33	E																

By the Immersion.

Apparent time of immersion,	9h	22′	29″	.2		=	140°	37′	18″	.00
Estimated longitude, West,	5	7	47	.4						
Corresponding time at Greenwich,	14	30	16	.6	Sun's R. A.		205	31	17	.37
Right ascension of the meridian, from beginning of ♈,							346	8	35	.37
Do. do. from beginning of ♍,							76	8	35	.37
Altitude of the nonagesimal,							49	35	51	.28
Longitude of the nonagesimal, from beginning of ♈,							5	51	6	.63
Moon's *true* longitude, (Naut. Alm.),							56	26	12	.93
true latitude, North, do.							4	30	25	.30
true distrnce from the nonagesimal, (East,)							50	35	6	.30
equatorial horizontal parallax,							1	1	3	.33
horizontal parallax, reduced (320 to 319),							1	0	58	.82
parallax in longitude							0	36	17	.78
apparent distance from nonagesimal, (East),							51	11	24	.08
parallax in latitude,							0	37	26	.94
apparent latitude, North,							3	52	58	.36
augmented semidiameter arising from apparent altitude,							0	16	47	.78
inflexion of light,							—	0	2	.98
semidiameter, corrected,							0	16	44	.80
Difference of apparent latitude, ✳ north of ☽'s center,							0	9	2	.80

Moon's semidiameter corrected,		1004″.80		
Difference of apparent latitude,		542 80		
	Sum,	1547 60	log.	3.1896587
	Diff.	462 —	log.	2.6646420
				2)5.8543007
				2.9271503.5
Arith. comp. cosine Moon's apparent latitude,				0.0009981.5
Difference ☽'s longitude,	14′ 7″.57	= 847″.57	log.	2.9281484

Star's longitude,			57°	16′ 37″.44
Parallax in longitude,			—	36 17 78
True longitude ☽'s limb, at the point of occultation,			56	40 19 66
Difference ☽'s longitude,			—	14 7 57
True longitude Moon's center, by calculation,			56	26 12 09
Apparent time at Greenwich, when the Moon had that longitude,			14h	30′ 15″.26
Apparent time of immersion at Washington,			9	22 .29 20
Longitude, in time, by the immersion,			5	7 46 06
	Equal to		76	56 30 90

By the Emersion.

Apparent time of emersion,	10h 17′ 7″.2	=	154°	16′ 48″.00
Estimated longitude, West,	5 7 47 4			
Corresponding time at Greenwich,	15 24 54 6	Sun's R. A.	205	33 26 53
Right ascension of the meridian, from beginning of ♈,			359	50 14 53
Do. do. from beginning of ♎,			89	50 14 53
Altitude of the nonagesimal,			54	55 35 78
Longitude of the nonagesimal, from beginning of ♈,			17	34 3 38
Moon's *true* longitude, (Naut. Alm.),			57	0 29 46
true latitude, North,			4	29 6 04
true distance from nonagesimal, (East),			29	26 26 08
equatorial horizontal parallax,			1	1 2 72
horizontal parallax, reduced, (320 to 319)			1	0 58 21
parallax in longitude,			0	32 9 36
apparent distance from nonagesimal, (East),			39	50 35 44
parallax in latitude,			0	32 18 54
apparent latitude, North,			3	56 47 50
augmented semidiameter, arising from apparent altitude,			0	16 50 15
inflexion of light,			—	0 2 98
semidiameter, corrected,			0	16 47 17
Difference of apparent latitude, ✱ north of ☽'s center,			0	5 13 66

Moon's semidiameter corrected,	1007″.17		
Difference of apparent latitude,	313 66		
	1320 83	log.	3 1208469
	693 51	log.	2 8410527
			2)5.9618996
			2.9809498
Arith. comp. cosine ☽'s apparent latitude,			0 0010311
Difference ☽'s longitude, 15′ 59″.36 =	959″.36	log.	2.9819809

Star's longitude,			57°	16′ 37″.44
Parallax in longitude,			—	32 9 36
True longitude ☽'s limb, at the point of occultation,			56	44 28 08
Difference of ☽'s longitude,			+	15 59 36
True longitude ☽'s center, by calculation,			57	0 27 44
Apparent time at Greenwich, when the Moon had that longitude,			15h	24′ 51″.37
Apparent time of the emersion at Washington,			10	17 7 20
Longitude, in time, found by the emersion,			5	7 44 17
	Equal to		76°	56′ 2 55
	By the immersion,		76	56 30 90
Mean result—Longitude of the place of observation,			76	56 16 72
Difference of longitude to the Capitol,			—	1 49 75
Longitude of the Capitol, by occultation of Oct. 20th, 1804,			76	54 26 97

Annular Eclipse of the Sun, on the 17th September, 1811, observed by Seth Pease, Esq. and others. North 71° W. one mile 3-8ths from the Capitol. Difference of longitude, — 1′ 26″.89.

Latitude of the place of observation, (estimated)		38° 53′	25″.00 N.
Do. do. reduced, (320 to 319)		38 42	54 43
Longitude assumed for calculation of the external contacts,		77 0	0 0

Beginning of the eclipse,	at	0h 22′ 9″	P. M. Apparent time.
Annulus formed,	at	2 2 6	
broken,	at	2 6 53	
End of the Eclipse,	at	3 36 53	

Obliquity of the ecliptic, September 17th, 1811, 23° 27′ 42″.70

Moon's Longitude at Greenwich (Naut. Alm.).

1811. Sept. 16.	Noon	158°	44′	5″	A																	
	Midnight	164	37	32	B	+ 5°	53′	27″	*a* 1													
17.	Noon	170	31	21	C	+ 5	53	49	*b* 1	+ 0′	22″	*a* 2				+ 0′	17′	*a* 3	— 1″	*a* 4		
	Midnight	176	25	49	D	+ 5	54	28	*c* 1	+ 0	39	*b* 2				+ 0	16	*b* 3				
18.	Noon	182	21	12	E	+ 5	55	23	*d* 1	+ 0	55	*c* 2										

Moon's Distance from the North Pole of the Ecliptic.

1811. Sept. 16.	Noon	90°	47′	30″	A																	
	Midnight	90	14	54	B	— 32′	36″	*a* 1														
17	Noon	89	42	7	C	— 32	47	*b* 1	— 0′	11″	*a* 2				+ 0′	19″	*a* 3				+ 1″	*a* 4
	Midnight	89	9	28	D	— 32	39	*c* 1	+ 0	8	*b* 2				+ 0	20	*b* 3					
18.	Noon	88	37	17	E	— 32	11	*d* 1	+ 0	28	*c* 2											

Difference of Sun and Moon's Longitudes.

1811. Sept. 16.	Noon	346°	3′	0	A	+ 5°	24′	9	*a* 1	+ 0′	22	*a* 2	+ 0′	16″	*a* 3	+ 1″	*a* 4
	Midnight	351	27	9	B	+ 5	24	31	*b* 1	+ 0	38	*b* 2	+ 0	17	*b* 3		
17.	Noon	356	51	40	C	+ 5	25	9	*c* 1	+ 0	55	*c* 2					
	Midnight	2	16	49	D												
18.	Noon	7	42	53	E	+ 5	26	4	*d* 1								

By the external Contacts.

Apparent time of beginning of the eclipse,			0h	22′	9″		=	5°	32′ 15″.00
Estimated longitude, West,			5	8	0				
Corresponding time at Greenwich,			5	30	9	Sun's R. A.		174	23 15 12
Right ascension of the meridian, from the beginning of ♈,								179	55 30 12
Do. do. from beginning of ♑,								90	4 29 88
Sun's longitude,								173	53 7 47
horizontal parallax,								0	0 8 70
semidiameter,								0	15 57 23
irradiation of light,								—	0 1 62
Altitude of the nonagesimal								55	1 1 16
Longitude of the nonagesimal, from beginning of ♈,								162	14 15 29
Moon's *true* longitude, (Nant. Alm.),								173	13 47 43
true latitude, north ascending,								0	32 53 39
true distance from the nonagesimal, (East)								10	59 32 14
horizontal parallax, reduced, (320 to 319)								0	54 5 38
horizontal parallax from the Sun,								0	53 56 68
parallax in longitude,								0	8 32 13
apparent longitude,								173	22 19 56
apparent distance from nonagesimal, (East)								11	8 4 27
parallax in latitude,								0	30 54 16
apparent latitude, North,								0	1 59 23
augmented semidiameter, arising from apparent altitude,								0	14 56 84
inflexion of light,								—	0 2 98
semidiameter, corrected,								0	14 53 86

Sun's semidiameter,		957″.23			
irradiation of light,	—	1 62			
semidiameter corrected,		955 61			
Moon's do. do.		893 86			
	Sum,	1849 47			
Moon's apparent latitude,		119 23			
	Sum,	1968 70		log.	3.2941795
	Diff.	1730 24		log.	3.2381065
					2)6.5822858
					3.2911429
Arith. comp. cosine Moon's apparent latitude,					0.0000001
Difference of apparent longitude,	30′ 45″.62	=	1845″ 62	log.	3.2661430

Sun's longitude, at beginning of the eclipse,						173°	53′	7″.47
Parallax in longitude,						—	8	32 13
True longitude ☽'s limb, at the point of contact,						173	44	35 34
Difference of apparent longitude,						—	30	45 62
True longitude ☽'s center, by calculation,						173	13	49 72
Apparent time at Greenwich, when the Moon had that longitude,						5h	30′	13″.35
Apparent time of beginning of eclipse at Washington,						0	22	9 —
Longitude, in time, by 1st external contact,						5	8	4 35
					Equal to	77°	1′	5″.25

Second external Contact.

Apparent time of the end of the eclipe,						54°	13′	15″.00
Estimated longitude, West,	3h	36′	53″					
	5	8	0					
Corresponding time at Greenwich,	8	44	53	Sun's R. A.		174	30	32 25
Right ascension of the meridian, from the beginning of ♈,						228	43	47 25
Do. do. from the beginning of ♑,						41	16	12 75
Sun's longitude,						174	15	57 26
semidiameter,						0	15	57 26
horizontal parallax,						0	0	8 70
irradiation of light,						—	0	1 62
Altitude of the nonagesimal,						36	10	25 85
Longitude of the nonagesimal, from beginning of ♈,						209	18	40 65
Moon's *true* longitude, (Naut. Alm.)						174	49	40 69
true latitude, north ascending,						0	41	43 03
true distance from the nonagesimal, (West)						34	28	59 76
horizontal parallax, reduced, (320 to 319)						0	54	6 19
horizontal parallax from the Sun,						0	53	57 49
parallax in longitude,						0	18	10 25
apparent distance from the nonagesimal, (West)						34	47	10 01
apparent longitude,						174	31	30 44
parallax in latitude,						0	43	34 22
apparent latitude, South,						0	1	51 19
augmented semidiameter, arising from apparent altitude,						0	14	52 62
inflexion of light,						—	0	2 98
semidiameter, corrected,						0	14	49 64

Sun's semidiameter,		957″.26				
irradiation of light,		— 1 62				
semidiameter, corrected,		955 64				
Moon's do. do.		889 64				
Sum of semidiameters,		1845 28				
Moon's apparent latitude,		111 19				
Sum,	1956 47			log.	3.2914710	
Diff.	1734 09			log.	3.2390716	
					2)6.5305426	
					3.2652713	
Arith. comp. cosine Moon's apparent latitude,					0.0000001	
Difference Moon's longitude,	30′ 41″.92	=	1841″ 92	log.	3.2652714	
Sun's longitude at end of the eclipse,					174° 1′ 3″.24	
Parallax in longitude,					+ 18 10 25	
True longitude ☽'s limb at the point of contact,					174 19 13 49	
Difference ☽'s longitude,					+ 30 41 92	
True longitude ☽'s center, by calculation,					174 49 55 41	
Apparent time at Greenwich, when the Moon had that longitude,					8h 45′ 22″.89	
Apparent time of the end of the eclipse at Washington,					3 36 53 —	
Longitude, in time, by end of the eclipse,					5 8 29 89	
			Equal to		77° 7′ 28″ 35	

By the internal Contacts.

Annulus formed at,	2h 2′ 6″.00			30° 31′ 30″.00	
Estimated longitude, West,	5 8 18 79				
Corresponding time at Greenwich,	7 10 24 79	Sun's R. A.		174 27 0 19	
Right ascension of the meridian, from beginning of ♈,				204 58 30 19	
Do. do. from beginning of ♑,				65 1 29 81	
Sun's longitude,				173 57 12 42	
semidiameter,				0 15 57 25	
horizontal parallax,				0 0 8 70	
Altitude of the nonagesimal,				45 10 41 21	
Longitude of the nonagesimal, from beginning of ♈,				184 18 3 45	
Moon's *true* longitude,				174 3 9 19	
true latitude, north ascending,				3 37 26 30	
true distance from the nonagesimal, (West)				10 14 54 26	
horizontal parallax, reduced (320 to 319)				0 54 5 79	
horizontal parallax from the Sun,				0 53 57 09	
parallax in longitude,				0 6 53 04	
apparent distance from the nonagesimal, (West)				10 21 47 30	
apparent longitude,				173 56 16 15	
parallax in latitude,				0 38 2 19	
apparent latitude, South,				0 0 35 89	
augmented semidiameter, arising from apparent altitude,				0 14 55 49	

No allowance is made in the calculation by the internal contacts, for irradiation of the Sun's, or inflexion of the Moon's, light.

Sun's semidiameter,		975″.25			
Moon's augmented do.		895 49			
Diff.		61 76			
Moon's apparent latitude,		35 89			
Sum,	97 65		log.	1.9896722	
Diff.	25 87		log.	1.4127964	
				2)3.4024686	
				1.7012343	
Arith. comp. cosine Moon's apparent latitude,				0.0000000	
Difference Moon's longitude,	= 0′ 50″.26		log.	1.7012343	

Sun's longitude,			173° 57′	12″.42
Parallax in longitude,			+ 6	53 04
Difference ☽'s longitude,			— 0	50 26
True longitude ☽'s center, by calculation,			174 3	15 20
Apparent time at Greenwich, when the Moon had that longitude,			7h 10′	36″.91
Apparent time of formation of annulus at Washington,			2 2	6 —
Longitude, in time, by first internal contact,			5 8	30 91
	Equal to		77° 7′	43″ 65

Second internal Contact.

Annulus broken at,	2h 6′ 53″.00		31° 43′	15″.00
Estimated longitude, West,	5 8 18 79			
Corresponding time at Greenwich,	7 15 11 79	Sun's R. A.	174 27	10 92
Right ascension of the meridian, from beginning of ♈,			206 10	25 92
Do. do. from beginning of ♑,			63 49	34 08
Sun's longitude,			173 57	24 11
semidiameter,			0 15	57 25
horizontal parallax,			0 0	8 70
Altitude of the nonagesimal,			44 42	9 15
Longitude of the nonagesimal, from beginning of ♈,			185 26	28 61
Moon's *true* longitude,			174 5	30 51
true latitude, north ascending,			0 37	39 31
true distance from the nonagesimal, (West)			11 20	58 10
horizontal parallax, reduced (320 to 319)			0 54	5 81
horizontal parallax from the Sun,			0 53	57 11
parallax in longitude,			0 7	33 02
apparent distance from the nonagesimal, (West)			11 28	31 12
apparent longitude,			173 57	57 49
parallax in latitude,			0 38	21 24
apparent latitude, South,			0 0	41 93
augmented semidiameter, arising from apparent altitude,			0 14	55 17

Sun's semidiameter,		957″.25		
Moon's augmented do.		895 17		
	Diff.	62 08		
Moon's apparent latitude,		41 93		
	Sum,	104 01	log.	2.0170751
	Diff.	20 15	log.	1.3042751
				2)3.3213502
				1.6606751
Arith. comp. cosine Moon's apparent latitude,				0.0000000
Difference ☽'s longitude,		0′ 45″.78	log.	1 6606751

Sun's longitude,			173°	57′ 24″ 11
Parallax in longitude,			+	7 33 02
Difference ☽'s longitude,			+	0 45 78
True longitude ☽'s center, by calculation,			174	5 42 91
Apparent time at Greenwich, when the Moon had that longitude,			7h	15′ 37″.39
Apparent time of breaking annulus at Washington,			2	6 53 —
Longitude, in time, by 2d internal contact,			5	8 44 39
		Equal to	77°	11′ 5″.85
	By 1st internal	contact,	77	7 43 65
	1st external	do.	77	1 5 25
	2d external	do.	77	7 28 35
Mean result—Longitude of the place of observation,			77	6 50 77
Difference of longitude to the Capitol,			—	1 26 89
Longitude of the Capitol, by solar eclipse,			77	5 23 88

JANUARY 12th, 1813.

Occultation of ρ *Taurus*, by the Moon. Immersion *only*, observed with sufficient accuracy, by Messrs. Abraham Bradley and Seth Pease. North 75° W. one mile 7-10ths (estimated) from the Capitol—difference of longitude — 1′ 49″.75.

Latitude of the place of observation, estimated,		38° 53′	30″.00 N.
Do. do.	reduced (320 to 319)	38 42	59 .44
Longitude assumed for the calculation		76 57	30 —W.

By De La Lande's Tables.

Star's *mean* right ascension	62°	17′	24″.14	*Mean* Declination N.	15°	10′	5″.82
Nutation -	—	0	10 .34	Nutation -	—	0	8 .62
Aberration - -	+	0	13 .56	Aberration	+	0	0 .93
Right ascension -	62	17	27 .36	Declination N.	15	9	58 .13
Obliquity of the ecliptic, January 12th, 1813,				-	23°	27′	43″.50
Star's longitude, by computation -				-	63	11	18 .25
latitude, south, do. - -				-	5	45	6 .07

Moon's Longitude at Greenwich (Naut. Alm.).

1813. Jan. 11. Noon	41°	38′	21″	A												
Midnight	48	48	25	B	+	7°	10′	4″	*a* 1	+	55″	*a* 2	—	30″	*a* 3	— 6″. *a* 4
12. Noon	55	59	24	C	+	7	10	59	*b* 1	+	25	*b* 2	—	36	*b* 3	
Midnight	63	10	48	D	+	7	11	24	*c* 1	—	11	*c* 2				
13. Noon	70	22	01	E	+	7	11	13	*d* 1							

Moon's Latitude, South.

1813. Jan. 11. Noon	5°	9′	49″	A												
Midnight	5	13	5	B	+	3′	16″	*a* 1	—	4′	54″	*a* 2	+	0″	*a* 3	+ 7″ *a* 4
12. Noon	5	11	27	C	—	1	38	*b* 1	—	4	54	*b* 2	+	7	*b* 3	
Midnight	5	4	55	D	—	6	32	*c* 1	—	4	47	*c* 2				
13. Noon	4	53	36	E	—	11	19	*d* 1								

Time of immersion by watch,			5h	55′	28″				
Watch too fast, -			—	8	39				
Apparent time of immersion, -			5	46	49			86°	42′ 15″.00
Estimated longitude, West, -			5	7	50				
Corresponding time at Greenwich,			10	54	39	Sun's R. A.		294	15 30 95
Right ascension of the meridian, from the beginning of ♈, -								20	57 45 95
Do. do. from beginning of ♑, -								110	57 45 95
Altitude of the nonagesimal - - -								62	26 37 89
Longitude of the nonagesimal, from beginning of ♈, -								34	43 50 50
Moon's *true* longitude, (Naut. Alm.), - - -								62	31 38 54
true latitude, south, - - -								5	5 42 58
true distance from the nonagesimal, (East) - -								27	47 48 04
equatorial horizontal parallax, - -								0	59 28 91
horizontal parallax, reduced, (320 to 319) - -								0	59 24 51
parallax in longitude, - - -								0	24 59 84
apparent distance from nonagesimal, (East) - -								28	12 47 88
parallax in latitude, - - -								0	31 54 57
apparent latitude, South, - - - -								5	37 37 15
augmented semidiameter, arising from apparent altitude, -								0	16 26 55
inflexion of light, - - -								0	0 2 98
semidiameter, corrected, - - -								0	16 23 57
Difference of apparent latitude, ✱ south of ☽'s center, -								0	7 28 92

Moon's semidiameter, corrected		983″ 57		
Difference of apparent latitude		448 92		
	Sum,	1432 49	log.	3.1560916
	Diff.	534 65	log.	2.7280696
				2)5.8841612
				2.9420806
Arith. comp. cosine Moon's apparent latitude				0.0020978
Diff. ☽'s longitude	14′ 39″.38	= 879″.38	log.	2.9441784
Star's longitude,				63° 11′ 18″.25
Parallax in longitude,				— 24 59 84
True longitude ☽'s limb, at the point of occultation,				62 46 18 41
Difference of longitude,				— 14 39 38
True longitude of ☽'s center, by calculation,				62 31 39 03
Apparent time at Greenwich, when the Moon had that longitude,				10h 54′ 39″.82
Apparent time of the immersion at Washington,				5 46 49 —
Longitude, in time, found by the immersion,				5 7 50 82
		Equal to		76° 57′ 42″ 30
Difference of longitude from the place of observation to the Capitol,				— 1 49 75
Longitude of the Capitol,				76 55 52 55

Results.

By the occultation of January 21st, 1793,	76° 46′ 17″.85
of October 20th, 1804,	76 54 26 97
Solar eclipse, Sept. 17th, 1811,	77 5 23 88
occultation of January 12th, 1813,	76 55 52 55
Mean result,	76 55 30 31

Equal to 5h 7′ 42″.02, in time.

City of Washington, July 4th, 1817.

SIR,

IT was my intention to have sent you the above abstracts of astronomical calculations, some time ago, for the use of the American Philosophical Society. Relying on your candour, and knowledge of the subject, I flatter myself, that the work submitted to your inspection, will be estimated according to its *real* value. The ratio of 320 to 319, of the equatorial to the polar diameter of the earth, has been used, as a proportion supposed (if not actually found) to be more accurate than that of 334 to 333, or 230 to 229. The Moon's positions, at noon and midnight, in longitude and latitude, as given in the British Nautical Almanacs, have been considered as *strictly correct*, as well as the apparent times of the phenomena: and as no corresponding observations at Greenwich could be resorted to, the errors in the lunar tables are not known. It will be recollected, that M. Burg's improved tables were not used at Greenwich, until the year 1813, so that, in the preceding years, the errors of the tables might considerably affect the latitude of a place as far distant as the city of Washington. Whether these, or any arising from the apparent times, have produced a variance of 19 minutes of longitude between the results of the first and third observations, I am at a loss to discover; but if a mean of both be taken, it will be found not to deviate much from the results of the others, as shewn by the following statement:

Result, January 21st, 1793 -	76° 46′ 17″.85
Do. September 17th, 1811	77 5 23 .86
Mean result -	76 55 50. 86

agreeing very nearly with the last, and differing 1′ 23″½ of longitude from the third observation.

I need not remark to you that occultations and solar eclipses afford the best means to ascertain the longitude of a place with precision; and although that of the Capitol in Washington, from Greenwich, may not yet have been correctly determined, for want of a greater number of observations, it is believed, that the *mean* result herewith furnished, is a near approximation to the truth.

I am, very respectfully,
Your most obedient servant,
WILLIAM LAMBERT.

Robert Patterson, Esq.
A Vice President of the Am. Phil. Soc. Philadelphia.